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ABSTRACT

In this study comprehension of sentences describing two events occurring simultaneously or in sequence was assessed in 5-, 7- and 9-year-old children. The sentences were at three different levels of linguistic complexity, differing only in whether simultaneity or sequentiality was described. Subjects were kindergarten, second, and fourth grade children from middle class homes where English was the only language used. Sentence comprehension was measured by a verification task. Results indicate that sentences describing simultaneity were better understood than descriptions of sequentiality. This finding supports the hypothesis that the cognitive complexity of the meaning expressed by language forms is an important determinant of comprehension. Findings contradict previous studies using different tasks that found opposite results, suggesting that cognitive complexity is not an absolute property of concepts, but depends on the processing requirements of specific tasks. The requirements of several previous tasks are compared to those of the present task, in which memory requirements were greater for sentences expressing sequentiality. (Author/SB)

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Children's Comprehension of Sentences Expressing Simultaneity and Sequentiality

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Children's Comprehension of Sentences
Expressing Simultaneity and Sequentiality

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An important goal for research on language development is to specify the factors which determine the difficulty of different aspects of language, and thus, account for the order in which different language forms are acquired. In the present study we tested the hypothesis that the cognitive difficulty of the meanings expressed by language is an important determinant of the difficulty of comprehending language forms. Specifically, we focused on words and phrases which express the temporal relationships of simultaneity and sequentiality.

Previous studies looking for a relationship between cognitive difficulty and language difficulty have generally taken one of two approaches. Sometimes previous work in cognitive development was used to predict the course of language development. Then experimental results were compared with these predictions (e.g., Parisi and Antinucci, 1971). Alternatively, within a single study a correlation was sought between children's performance on a non-linguistic task and the children's language ability in the same conceptual domain (e.g., Weil, Note 1).

Studies using these methods have found that language forms expressing simultaneity are acquired later than those expressing sequentiality (Keller-Cohen, Note 2; Feagans, Note 3). This finding had been predicted on the basis of several experiments by Piaget (1971). For example, Piaget showed

children two snails moving along parallel courses at different speeds. When the snails stopped at the same time, preoperational children reported that the snail which covered less distance stopped first. Because children report sequentiality when they actually had seen simultaneity, sequentiality has been considered to be the easier concept.

In the present study we used a different method and found a very different result. In order to avoid the impossible task of designing independent measures of cognitive and linguistic abilities, we instead looked for consistency in the order of difficulty of several language forms expressing these two concepts as evidence of the influence of cognitive difficulty on language development.

We constructed three sentence pairs such that linguistic difficulty within each pair was comparable. The sentences differed only in whether simultaneity or sequentiality was described. At the simplest level of linguistic difficulty, simultaneity was expressed in the sentence

The lady waved at the same time the man clapped.

Sequentiality was expressed in the sentence

The lady waved last, the man clapped first.

The second pair of sentences used the same time words but described the temporal relationship between the stopping times of the two actions. For simultaneity, the sentence was

The man stopped clapping at the same time the lady stopped waving.

For sequentiality, the sentence was

The man stopped clapping last, the lady stopped waving first.

In the third sentence pair the temporal relationships were indicated by conjunctions. The sentence

While the man clapped the lady waved.

expressed simultaneity. The sentence

Before the lady waved the man clapped.

expressed sequentiality.

We reasoned that the relative difficulty of the concepts of simultaneity and sequentiality should influence the relative difficulty of language forms expressing these relationships. Therefore, on a comprehension task the order of difficulty between the sentence expressing simultaneity and the sentence expressing sequentiality should be constant across all three sentence pairs.

We tested kindergarten children (mean age = 5.31 yrs.), second graders (mean age = 7.44 yrs.), and fourth graders (mean age = 9.39 yrs.). All came from middle class homes where standard English was the only language spoken. We measured sentence comprehension by a verification task. The child first heard a sentence read twice. Then he or she viewed a situation presented on a video monitor. The child then said whether the sentence was "right" or "wrong" in describing the actions on TV. Each sentence was paired with three video situations depicting three different temporal relationships between the events in the sentence: the events were simultaneous, or the event mentioned first occurred first, or the event mentioned second occurred first. All sentences which expressed sequentiality were written so that an order-of-mention interpretation would result in a wrong response. For each trial, the child received a score of "1" for a correct response or "0" for an incorrect response or no response.

The results of an analysis of variance performed on the data fulfilled our prediction of consistency. As you can see on this graph (Figure 1), simultaneity was better understood than sequentiality across all sentence pairs. This effect of temporal relationship was significant at the .0001 level ($F(1, 87) = 58.99$). There was also a significant effect of grade ($F(2, 87) = 24.00$, $p < .0001$), with performance improving with age. And, there was an interaction between temporal relationship and grade ($F(2, 87) = 5.21$, $p < .05$). As you can see, the difference in difficulty between simultaneity and sequentiality tends to be greatest at the youngest age levels.

We had predicted this consistency in the order of difficulty between simultaneity and sequentiality only for comparisons within sentence pairs where differences between the sentences due to linguistic complexity were controlled. However, for these ages and sentences, differences in linguistic difficulty among sentence pairs were outweighed by the difference in cognitive complexity between the two concepts. Simultaneity was better understood than sequentiality even for comparisons across sentence pairs (Scheffé test, $p < .05$).

So, within this study the data were consistent. Sentences expressing sequentiality were always more difficult than sentences expressing simultaneity. We infer that the differences in sentence comprehension were due to a difference in the cognitive complexity of the two concepts. However, the direction of our result is the opposite of previous findings that simultaneity is the more difficult concept. It is important to explain this discrepancy.

We suggest that the difficulty of any concept is not constant across all ways of measuring its acquisition. Rather, it depends on the particular

requirements for using a concept in a particular context. The tasks in this study and previous studies differ, and the different task demands can account for the apparent contradiction in findings.

For example, in the Piagetian research, children were required to recognize simultaneity in the face of contradictory spatial cues. The finding that children cannot do this before age nine is not evidence on the difficulty of simultaneity compared to sequentiality.

Studies which have directly compared the two concepts (Keller-Cohen, Note 2; Feagans, Note 3) used a task in which the child hears a sentence and then is required to act it out with toys. These studies used preschool subjects, and for them, the physical difficulty of performing two actions at once may have made production of simultaneity responses less likely, regardless of differences in sentence comprehension.

For another kind of task (Keller-Cohen, Note 2) there is a more interesting reason for better performance on sequentiality. In this task, the experimenter demonstrated a temporal relationship with toys and then asked the child when one of the events happened. Such verbal descriptions of sequentiality appear earlier in the child's speech than descriptions of simultaneity possibly because speech is itself a sequential medium. For sequential events there was congruity between the situation being described and the form of the description. For simultaneous events, there was no such congruity.

Now, just as the requirements made by previously-used tasks may account for their findings, similarly, analysis of the task used in the present study reveals a possible explanation of our findings. Here the child's task was

essentially to make a judgment of match or mismatch between the sentence heard and the situation viewed. When the sentence expressed simultaneity, the child had to discriminate only whether the situation depicted simultaneity or sequentiality and reject the sequential situation. When the sentence expressed sequentialtiy, however, the child had to discriminate not only whether the situation depicted simultaneity or sequence, but also for sequential situations, whether the order of events matched. Thus, sentences expressing sequentiality required a more complex discrimination.

In addition, our task required the child to remember the encoding of the sentence while viewing the situation. Thus, the memory demands were greater than in previously used tasks. According to Richard Hurtig's (Note 4, 5) theory concerning memorial representations of temporal relationships, simultaneity is more stable in memory than sequentiality. Therefore, this greater memory requirement also could have contributed to our finding of poorer performance on sequentiality.

We interpret the very strong finding of consistency in this study as support for the hypothesis that the cognitive difficulty of the meanings language expresses is an important influence on the difficulty of language forms. We believe that the reversal of the order of difficulty between simultaneity and sequentiality compared to previous studies is due to differences in the processing requirements of the tasks used. We therefore conclude that conceptual difficulty does influence language difficulty, but that cognitive difficulty is not an absolute property of concepts.

Finally, an important task for future research is to specify the mental processes elicited by particular tasks and to incorporate such processing models into research on the cognitive foundations of language.

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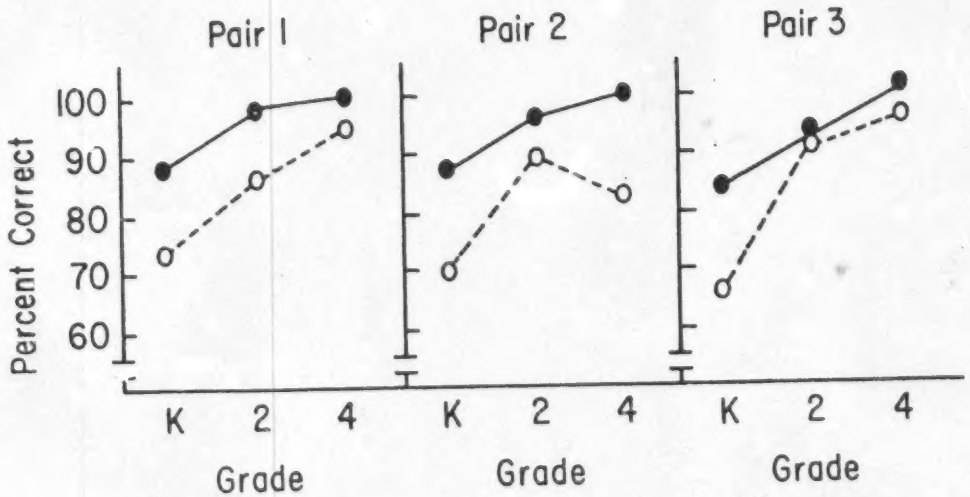
Figure 1



Percent correct judgments for each sentence pair and grade on sentences expressing simultaneity or sequentiality. Solid line = simultaneity; dotted line = sequentiality.